

A Landscape-Level Assessment Method for Depressional Wetlands in Florida

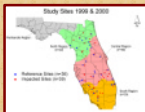
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Goal: to create a GIS-based method to quantify agricultural disturbance gradients affecting wetlands that is independent of the biology measured therein.

Solution: the creation of a Landscape Development Intensity (LDI) Index based on wetland drainage basin land uses for 75 depressional marshes in Florida.

Primary Factors Considered:

- Sediment and Nutrient Loading
- Hydrologic Alterations
- Physical Impacts



...And Applied the Following Coefficients:

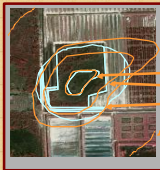
- 1-2 Upland Forest or Wetland
- 2.5-3 Pine Plantation
- 3-4 Rangeland
- 4-5 Woodland Pasture
- 6 Field and Citrus Crops
- 7-8 Improved Pastureland
- 9 Intense Row Crops
- 10 Feed lots and Dairy Operations

Landscape Development Intensity Equation:

$$LDI = \sum (LDC * \%LU)$$

Where,

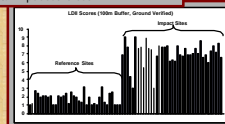
- LDI = Landscape Development Intensity Index
- LDC = Disturbance Coefficient Associated with the Particular Land Use
- %LU = Percent Area of the Wetland Drainage Basin Occupied by the Land Use Category



We tested four different areas...

- 18 meters
- 100 meters
- 150 meters
- 500 meters

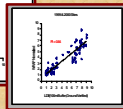
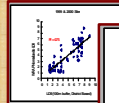
The LDI with a 100m wetland drainage basin was able to best distinguish between Reference & Impacted sites



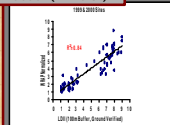
Ground-truthing the land use coverage also increased the correlation between LDI & WRAP from $r^2 = 0.75$ to $r^2 = 0.84$.

To test the LDI, we correlated the scores with the Wetland Rapid Assessment Procedure (WRAP; Miller & Gonsalus 1997)

- South Florida Water Mgmt. District Regulatory tool to evaluate wetland sites
- Measured Variables (0.0 - 3.0; we normalized these values to 10)
 - Wildlife Utilization
 - Wetland Overstory/Shrub Canopy
 - Ground Cover
 - Adjacent Uplands / Wetland Buffer
 - Hydrologic Indicators
 - Water Quality Inputs / Treatment



There was a strong correlation ($r^2 = 0.84$)...



SUMMARY:

- LDI is an independent measure of disturbance...
 - quantifies disturbance gradients...
 - distinguishes between reference and impact sites...
 - straight forward and economically efficient

